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1: Mol Gen Genet. 1994 Nov 15;245(4):406-16.

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## Functional assignment of *Erwinia herbicola* Eho10 carotenoid genes expressed in *Escherichia coli*.

Hundle B, Alberti M, Nievelstein V, Beyer P, Kleinig H, Armstrong GA, Burke DH, Hearst JE.

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Erwinia herbicola is a nonphotosynthetic bacterium that is yellow pigmented to the presence of carotenoids. When the *Erwinia* carotenoid biosynthetic genes are expressed in *Escherichia coli*, this bacterium also displays a yellow phenotype. The DNA sequence of the plasmid pPL376, carrying the entire *Erwinia* carotenoid gene cluster, has been found to contain 12 open reading frames (ORFs). Six of the ORFs have been identified as carotenoid biosynthesis genes that code for all enzymes required for conversion of farnesyl pyrophosphate (FPP) to zeaxanthin diglucoside via geranylgeranyl pyrophosphate, phytoene, lycopene, beta-carotene and zeaxanthin. These enzymatic steps were assigned after disruption of each by a specific mutation and analysis of the accumulated intermediates. Carotenoid intermediates were identified by the absorption spectra of the colored compounds and by high pressure liquid chromatographic analysis. The six carotenoid genes are arranged in at least two operons. The gene coding for beta-carotene hydroxylase is transcribed in the opposite direction from that of the other carotenoid genes and overlaps with the gene for phytoene synthase.

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